WHAT IS CLAIMED IS:

1. A method of extending time between chamber cleaning processes for a process chamber of a processing system, the method comprising:

exposing a chamber component in the process chamber to a reactant gas to form a particle-reducing film, wherein the film is:

an oxide or oxynitride film formed on a clean surface of the chamber component,

an oxide or oxynitride film formed on a pre-existing deposit residing on the chamber component, or

a nitride, oxide or oxynitride film formed from at least a portion of a pre-existing deposit residing on the chamber component;

introducing at least one substrate in the process chamber;

performing a manufacturing process on the at least one substrate in the process chamber whereby a new deposit is formed on the particle-reducing film, and wherein the particle-reducing film reduces particle formation in the process chamber during substrate processing from one or both of the pre-existing deposit or the new deposit; and

removing the at least one substrate from the process chamber.

2. The method according to claim 1, wherein the chamber component is a process tube, a wall, a gas supply line, a manifold, or a substrate holder or a combination of two or more thereof.

3. The method according to claim 1, wherein the particle-reducing film is an oxide film.

4. The method according to claim 1, wherein the particle-reducing film is a SiO_2 film.

5. The method according to claim 4, wherein the SiO_2 film is deposited by exposing the chamber component to an oxygen-containing gas and a silicon-containing gas.

6. The method according to claim 5, wherein the oxygen-containing gas includes at least one gas selected from the group consisting of O_2, O_3, NO, N_2O, and NO_2, and the silicon-containing gas includes at least one gas selected from the group consisting of SiH_4, Si_2H_6, Si_2Cl_6, SiH_2Cl_2, $SiHCl_3$, SiH_3Cl, $SiH_2(NHBu^t)_2$, and $Si(OC_2H_5)_4$.

7. The method according to claim 4, wherein the SiO_2 film is deposited by exposing the chamber component to a gas comprising $Si(OC_2H_5)_4$.

8. The method according to claim 1, wherein the reactant gas includes at least one gas selected from the group consisting of H_2O, O_2, O_3, N_2, NO, N_2O, NO_2, and NH_3 to form the nitride, oxide, or oxynitride film from at least a portion of the pre-existing deposit by chemically modifying and lowering the film stress of the pre-existing deposit.

9. The method according to claim 1, further comprising:

elevating the temperature of the chamber component from a first temperature to a second temperature and exposing the chamber component to the reactant gas at the second temperature; and

returning the temperature of the chamber component to the first temperature prior to introducing the at least one substrate.

10. The method according to claim 9, wherein the exposing is performed at a process chamber pressure between about 10mTorr and about 100Torr.

11. The method according to claim 9, wherein the exposing further comprises purging and evacuating the process chamber prior to introducing the at least one substrate.

12. The method according to claim 11, wherein the exposing, purging, and evacuating are repeated at least once.

13. The method according to claim 9, wherein the first temperature is between about 400°C and about 800°C.

14. The method according to claim 9, wherein the second temperature is between about 100°C and about 300°C greater than the first temperature.

15. The method according to claim 9, further comprising lowering the temperature of the chamber component from the second temperature to below the first temperature prior to returning the temperature of the chamber component to the first temperature.

16. The method according to claim 1, wherein the performing comprises performing a SiN manufacturing process, and wherein the new deposit is SiN.

17. The method according to claim 1, wherein the performing further comprises providing a process chamber pressure less than about 100Torr.

18. The method according to claim 1, wherein the performing further comprises providing a process chamber pressure less than about 1Torr.

19. The method according to claim 1, further comprising repeating the exposing, introducing, performing, and removing at least once.

20. The method according to claim 19, further comprising repeating the introducing, performing, and removing at least once before repeating the exposing.

21. The method according to claim 1, further comprising repeating the introducing, performing, and removing at least once and until particle levels in the process chamber exceed a pre-determined level.

22. A method of extending time between chamber cleaning processes for a process chamber of a processing system, the method comprising:

exposing a chamber component in the process chamber to a silicon-containing and oxygen-containing reactant gas to form a SiO_2 film on a clean surface of the chamber component or on a pre-existing deposit residing on the chamber component;

introducing at least one substrate into the process chamber;

performing a SiN manufacturing process in the process chamber whereby a SiN deposit is formed on the SiO_2 film, and wherein the SiO_2 film reduces particle formation in the process chamber during substrate processing from one or both of the pre-existing deposit or the SiN deposit; and

removing the at least one substrate from the process chamber.

23. The method according to claim 22, further comprising repeating the exposing, introducing, performing, and removing at least once.

24. The method according to claim 23, further comprising repeating the introducing, performing, and removing at least once before repeating the exposing.

25. The method according to claim 22, further comprising repeating the introducing, performing, and removing at least once and until particle levels in the process chamber exceed a pre-determined level.

26. The method according to claim 22, wherein the SiN manufacturing process includes exposing the at least one substrate to an organic silane-based precursor and a nitrogen-containing gas to deposit SiN on the at least one substrate.

27. The method according to claim 22, wherein the SiN manufacturing process includes exposing the at least one substrate to a bis-tertiary-butylamino-silane precursor in the presence of ammonia gas to deposit SiN on the at least one substrate.

28. A method of extending time between chamber cleaning processes for a process chamber of a processing system, the method comprising:

exposing a pre-existing deposit on a chamber component in the process chamber to a reactant gas containing at least one of H_2O, O_2, O_3, N_2, NO, N_2O, NO_2, and NH_3 to chemically modify at least a portion of the pre-existing deposit to thereby form a nitride, oxide or oxynitride film on the chamber component;

introducing at least one substrate in the process chamber;

performing a SiN manufacturing process in the process chamber whereby a SiN deposit is formed on the film, and wherein the film reduces particle formation in the process chamber during substrate processing from one or both of the pre-existing deposit or the SiN deposit; and

removing the at least one substrate from the process chamber.

29. The method according to claim 28, further comprising repeating the exposing, introducing, performing, and removing at least once.

30. The method according to claim 29, further comprising repeating the introducing, performing, and removing at least once before repeating the forming.

31. The method according to claim 28, further comprising repeating the introducing, performing, and removing at least once and until particle levels in the process chamber exceed a pre-determined level.

32. The method according to claim 28, wherein the SiN manufacturing process includes exposing the at least one substrate to an organic silane-based precursor and a nitrogen-containing gas to deposit SiN on the at least one substrate.

33. The method according to claim 28, wherein the SiN manufacturing process includes exposing the at least one substrate to a bis-tertiary-butylamino-silane precursor in the presence of ammonia gas to deposit SiN on the at least one substrate.

34. A computer readable medium for storing program instructions and being executable by a processor to cause a processing apparatus: to expose a chamber component in a process chamber to a reactant gas to form one of an oxide or oxynitride film on a clean surface of the chamber component, an oxide or oxynitride film on a pre-existing deposit residing on the chamber component, or a nitride, oxide or oxynitride film from at least a portion of a pre-existing deposit residing on the chamber component; to introduce at least one substrate into the process chamber; to perform a manufacturing process on the at least one substrate in the process chamber whereby a new deposit is formed on the particle-reducing film, and wherein the particle-reducing film reduces particle formation in the process chamber during substrate processing from one or both of the pre-existing deposit or the new deposit; and to remove the at least one substrate from the process chamber.